Corrections to Searle's "LINEAR MODELS"

BU-508-M S. R. Searle March, 1975

Corrections made in 2nd Printing

(Corrections made in 3rd Printing: see p. 8)

(Corrections needed for 4th Printing: see p. 9)

Page/line

v/10: structures should be strictures

vi/22: estimators should be solutions

xix/9: and should be of (sums of squares)

22/3: $\underline{H}'$ should be $\underline{H}$

23/6 up: (1969) should be (1969a)

23/4 up: delete two

25/4: remove prime from by and put after the first $\underline{M}$; i.e., "by $\underline{M}'(\underline{M}\underline{M}')^{-1}\underline{A}_{11}^{-1}$"

35/7: $\underline{x} = \underline{0}$ should be $\underline{x} \neq \underline{0}$

35/10 up: $\underline{y}'\underline{I}\underline{y}$ (insert prime after first $\underline{y}$)

36/Lemma 2: Add "or is not" after "P'AP is" and after "A is"

42/1: ∂t should be ∂t^k

50/mid-page: In 5 places v should be italicized.

51/mid-page: (38) should be (35)

53/8 up: Thus if u_1 is $\chi^{2\prime}(u_1,\lambda_1)$ should be Thus if u_1 is $\chi^{2\prime}(n_1,\lambda_1)$

88/mid-page: Then var($\underline{\lambda}'\underline{y}$) = should be Then v($\underline{\lambda}'\underline{y}$) = (the v being in italics).

Page/line

91/2: predicted should be fitted (in italics)

97/2: var[E(y)] should be var[$\widehat{E(y)}$]

100/4: X's should be X^2's (in title of e.)

102/Table 3.3: In the residual error sum of squares the last element $-\hat{\underline{\ell}}'\underline{X}'\underline{y}$ should be $-\hat{\underline{\ell}}'\underline{\mathcal{X}}'\underline{y}$.

112/10: K'b = m of the null hypothesis should be in bold face type.

121/4 up: 152.2 should be 152.55

129/13 up: Exercise 20 should be 19

131/11: $\sqrt{a^{ii}}$ should be $\sqrt{a^{ii}\hat{\sigma}^2}$ (i.e., in 11'th item on that page)

132/4 up: In (iii), $\tilde{\underline{b}} = \hat{\underline{\ell}} +$ should be $\tilde{\underline{b}} = \hat{\underline{b}} +$

132/2 up: In (iv), the first part of $\tilde{\underline{b}}$ is $\hat{\underline{b}}_p = \hat{\underline{\ell}} +$ and it should be $\tilde{\underline{\ell}}_p = \hat{\underline{\ell}}_p +$

133/3: Last letter $\tilde{\underline{b}}$ should be $\tilde{\underline{\ell}}$

133/Ex. 11: $\underline{y}'\underline{y}$ - (SSE + Q) should be $[\underline{y}'\underline{y} - (SSE + Q)]/\sigma^2$

133/Ex. 13: Sec. 6c should be Sec. 6d

133/11 up: 204.3 should be 204.65

133/7 up: SSR should be SSR_m (twice)

161/8: $4\frac{1}{2}$ should be $5\frac{1}{2}$

179/Table 5.7: F(R) = 6545.1 should be 654.51

180/5 of Sec.4: $\underline{q}$ should be $\underline{q}'$

Page/line

196/8: A zero is missing in $\underline{H}$ in the 3,4 position.

196/mid-page: (58) should be (85)

199/3: Q = should be F(H) =

201/mid-page: + 2(2)218(52) should be + 2(2)218(82)

214/3 below Eq.(110): the complete should be a complete

223/8 up: $-\underline{b}^{o\prime}\underline{T}\underline{w}$ should be $-\underline{b}^{o\prime}\underline{T}'\underline{w}$ (prime on $\underline{T}$)

234/last: variation should be total sum of squares

236/Eq. (48): The second + sign should be $\pm$

239/11 up: $E(\bar{y})$ should be $NE(\bar{y})$

245/Table 6.3: Last term of first row should be $n_{\cdot}\bar{y}^{2}_{\cdot\cdot}/\hat{\sigma}^{2}$ (superscript 2 on $\bar{y}_{\cdot\cdot}$) .

250/above (67): model (56) should be model (66)

251/Eq. (69): $y_{2\cdot}$ should be $y_{2\cdot\cdot}$

253/3: 5.99 should be 5.59

253/5: Delete do not

253/6: accounts should be does not account

254/5: fitting μ and α should be fitting α after μ

Page/line

257/10: $F(\beta : \alpha|\mu, \alpha)$ should be $F(\alpha|\mu)$

260/6: c should be a

260/Ex. 10: $R(\alpha|\mu)$ should be $R(\alpha|\mu)/\sigma^2$

$R(\beta : \alpha|\alpha, \mu)$ should be $R(\beta : \alpha|\alpha, \mu)/\sigma^2$

264/Sec. b: Delete last word, for.

266/Sec. d: In line 5, more should be fewer.

268/2: α_n^o should be α_a^o

268/4: (see Chapter 1) should be (see Sec. 1.1).

268/6: Delete subscript q from b_q

278/Table 7.4: Upper right and lower left entries: α and β should be Impossible

285/Table 7.5: In the second sum of squares, $\bar{y}_{i\cdot}$ should be $\bar{y}_{i\cdot}$ (dot too high).

285/Table 7.5: In residual error sum of squares, $\sum_i \sum_j (y_{ij} - \bar{y}_{\cdot\cdot})^2$ should be $\sum_i \sum_j (y_{ij} - \bar{y}_{i\cdot} - \bar{y}_{\cdot j} + \bar{y}_{\cdot\cdot})^2$

292/7 of Sec.d: j of $y_{\cdot j\cdot}$ needs its dot

302/7 up: $-\gamma_{12}$ should be $-\gamma_{13}$

309/3: $\underline{L}'\underline{y}$ should be $\underline{L}'\bar{\underline{y}}$ (bar over $\underline{y}$)

310/7 up: Shift -6 right, to be above 11

313/20: $\underline{\ell}_i'\underline{D}\underline{\ell}_j$ should be $\underline{\ell}_i'\underline{D}\underline{\ell}_j^*$ (star)

313/21: $\underline{\ell}_j'$ should be $\underline{\ell}_j^{*\prime}$ (star)

Page/line

313/23: $\underline{\ell}_j'\underline{D}$ at start of line should be $\underline{\ell}_i'\underline{D}$ (i not j)

313/23: }
313/24: } $\underline{\ell}_j'$ should be $\underline{\ell}_j^{*\prime}$ (star)

313/25: $\underline{\ell}_j$ should be $\underline{\ell}_j^{*}$ (twice)

327/Ex. 6: In line 3, $\underline{A} = \{a^{ii}\}$ should be $\underline{A}^{-1} = \{a^{ii}\}$

327/last: $\sum_{i=1}^{a} (\bar{x}_{i.} - \bar{x}_{..})^2$ should be $\sum_{i=1}^{a} n_i(\bar{x}_{i.} - \bar{x}_{..})^2$

330/middle: $\bar{y}_{..}$ should be $\bar{y}_{22}$

342/9 up: Exercise 3 should be 4

343/13: $\underline{b} = (\underline{R}_z'\underline{R}_z)^{-1}\underline{R}_z'\underline{y}$; the $\underline{b}$ should be $\hat{\underline{b}}$ (hat). [just after (14)]

343/16: z-variables should be z-residuals (z stays italicized)

343/10 up: model.] should be model, including μ.]

356/Eq. (49): $z_{i.}^2$ should be $\bar{z}_{i.}^2$ (bar)
$z_{i.}$ should be $\bar{z}_{i.}$ (bar)

357/4 up: The "1" should be shifted right, over the minus sign of the c-1.

359/line 2 below Table 8.8: $/n_{.2}$, should be $/n_{.}$,

366/below (65): In $E(MSAB_u)$, $\gamma_{..}$ should be $\bar{\gamma}_{..}$ (bar)

370/line 2 of body of Table: MSA_w should be MSB_w

371/Eq. (68): Delete w_i

375/Exercise 12: The entries for Treatment 3 should be

$$\begin{array}{rrr} -6 & 6 & 4 \\ 2 & 8 & 6 \\ & & 5 \\ & & 7 \end{array}$$

Page/line

380/7 up: $4\sigma_{\alpha}^2$ should be $4\sigma_{\beta}^2$

382/Sec. 3, line 9: progency should be progeny

389/last: with AB should be within AB

396/3 up: $\sum_{i=1}^{b}$ should be $\sum_{j=1}^{b}$ (j not i)

397/2 up from Table 9.6: $\bar{Y}'_{j.}$ should be $\bar{Y}'_{i.}$ (i not j)

397/2 up: $Y_{.j} + Y_{..}$ should be $\bar{Y}_{.j} + \bar{Y}_{..}$ (bars)

398/Eq. (19) 6'th term: $\bar{\mu}_{ij}$ should be μ_{ij}

last term: $\bar{e}_{...}$ should be e_{ijk}

398/2 up from Eq. (21): delete period and add: $+ \sigma_e^2$.

400/1 below Eq. (25): distributed independently of should be uncorrelated with

401/5 up: independent of should be uncorrelated with

408/last line before Sec. 9: Sec. 9d should be 9e (e not d)

425/Eq. (15): $n_{...}$ should be $n_{..}$

438/8: In k_2 insert minus before 2(a-1)

438/11: In the denominator of k_3, $(N^2 - S_2)$ should be $(N^2 - S_2)^2$

445/13: Delete comma after b_2 .

459/last line before (99): The sentence should be "Then, because var($\underline{e}$) = $\underline{R}$, the normal equations for the now completely fixed effects model would be"

Page/line

462/8: $\widehat{(E\underline{u}|\underline{y})}$ should be $\widehat{E(\underline{u}|\underline{y})}$

463/3: The denominator of $\tilde{\mu}$ needs a Σ sign.

471/Eq.(150): + t(SSE) should be - t(SSE)

474/2: T_A should be $T_A = \sum_{i=1}^{a} y_{i.}^2/n_i$.

474/last: + $t(T_o - T_A)$ should be - $t(T_o - T_A)$

480/Table 11.1: k_{15} should be $k_{15} = \Sigma_i(\Sigma_j n_{ij} n_{.j})^2/n_{i.}$

k_{28} should be $k_{28} = \Sigma_i \Sigma_j n_{ij}^4/n_{i.} n_{.j}$.

481/$\hat{\sigma}_\gamma^2$ before section c:

$(N - k_1)\delta_B$ should be $(N - k_1')\delta_B$ (prime on k_1)

last term + k_{23}) should be + k_{23}') (prime on k_{23})

481/between lines 5-4 up: add

and $\text{cov}(\hat{\underline{\sigma}}^2, \hat{\sigma}_e^2) = -\underline{P}^{-1}\underline{f}v(\hat{\sigma}_e^2)$, from (46) on page 434

482/Title to first row: $2\sigma_\alpha$ should be $2\sigma_\alpha^4$

483/9 up: $h_7 = N - h_4 = h_8$ should be $h_7 = N - k_4 = h_8$

488/5-7: The sentence containing $\text{var}(\hat{\sigma}^2)$ should read as:

Therefore

$$\text{var}(\underset{\sim}{\hat{\sigma}}^2) = \underset{\sim}{Q}^{-1}\underset{\sim}{H}\text{var}(\underset{\sim}{t})\underset{\sim}{H}'\underset{\sim}{Q}^{-1}, + 2\underset{\sim}{q}_3\underset{\sim}{q}_3'\sigma_e^4(N - s)$$

where $\underset{\sim}{q}_3$ is column 3 of $\underset{\sim}{Q}^{-1}$.

488/3 up: $-(a + b)\hat{\sigma}_e^2$ should be $-(a + b - 2)\hat{\sigma}_e^2$

520/16 up: marketing should be management

526/3: $\alpha = 0.5$ on figure should be $\alpha = .05$

Corrections made in 3rd Printing

Page/line

205/7 up: $+ \underline{P}'\underline{\theta}$ should be $+ \underline{P}\underline{\theta}$ (delete the prime from $\underline{P}$)

207/Eq. (100): This should be

$$F(H_r) = (SSE_{r,H} - SSE_r)/s\hat{\sigma}_r^2 \qquad (100)$$

211/3 up: The line for $F(H_r)$ should be

$$F(H_r) = \frac{SSE - SSE_r + (\underline{Q}'\underline{b}^o - \underline{\ell})'(\underline{Q}'\underline{G}\underline{Q})^{-1}(\underline{Q}'\underline{b}^o - \underline{\ell})}{s\hat{\sigma}_r^2}$$

212/4-3 up: Replace "and from Lemma 6 of Chapter 1"

by "and by applying Lemma 6 to (30) in Chapter 1"

290/1: In the table headings γ_3^o should be γ_{13}^o

316/4: $R(\mu|\alpha)$ should be $R(\alpha|\mu)$

316/7: $R(\mu|\alpha)$ should be $R(\alpha|\mu)$

343/13: The caret in $\hat{\underline{b}} =$ needs clarifying.

353/3: p. 385 should be p. 393

360/Equations (58) thru (62): z_{ij} should be z_{ijk} (5 times)

366/2 below Table 8.12: $-\bar{x}_{..}^2/ab$ should be $-x_{..}^2/ab$ (delete bar)

376/4: The semi-colon after are should be a comma.

486/5 of section b: $-k_4'$ should be $-k_4$ (delete prime)

488/3 up from section d: $q_3 q_3'$ should be in bold face type.

488/2 up from section d: q_3 should be in bold face type.

490/7: $(\underline{X}\underline{T}\underline{X}')^-$ should be $(\underline{X}'\underline{T}\underline{X})^-$ (shift prime)

491/5: σ_μ^2 should be σ_α^2

Corrections needed for 4th Printing

Page/line

15/4 up: align the 8 in +2(-8)

28/4 up from Sec.8: Add "$\underset{\sim}{AB}$," between "has" and $\underset{\sim}{AA}^{-}$" .

52/10 up: In the last integral on the page, the term in z is $z^{\frac{1}{2}n_2 + \frac{1}{2}n_2 + k - 1}$ and should be $z^{\frac{1}{2}n_1 + \frac{1}{2}n_2 + k - 1}$; the first n_2 should be n_1 .

61/1: Above the Σ, n should be p .

61/3: mutually should be pairwise

63/6 up: $\sum_{r\neq i\neq j}^{p} \underset{\sim}{X}_i$ should be $\sum_{r\neq i\neq j}^{p} \underset{\sim}{X}_r$ (change an i to r)

69/6: $(\underset{\sim\sim}{A}\underset{\sim}{\mu} + \frac{1}{2}\underset{\sim}{m})'\underset{\sim\sim}{V}(\underset{\sim\sim}{A}\underset{\sim}{\mu} + \frac{1}{2}\underset{\sim}{m})$ should be $\frac{1}{2}(\underset{\sim\sim}{A}\underset{\sim}{\mu} + \frac{1}{2}\underset{\sim}{m})'\underset{\sim\sim}{V}(\underset{\sim\sim}{A}\underset{\sim}{\mu} + \frac{1}{2}\underset{\sim}{m})$

72/running head: should be DISTRIBUTIONS (plural)

74/3: Corollary 2.1 should be 2.4

108/first line after (93): of α should be of $\frac{1}{2}\alpha$

130/2 up from Sec. 8: Thiel should be Theil

134/Ex. 19: $\text{cov}(\underset{\sim}{e},\underset{\sim}{\hat{b}}) = \underset{\sim}{X}(\underset{\sim}{X}'\underset{\sim}{X})^{-1}\sigma^2$ not $\sigma^2\underset{\sim}{I}$

160/running head: OF should be TO

164/3 up: Add comma after $\underset{\sim}{Xb}$: $(\underset{\sim}{Xb}, \sigma^2\underset{\sim}{I})$

174/last sentence of b: Replace that 1½-line sentence with "Notice that the variance-covariance matrix of $\underset{\sim}{b}^{o}$ is singular."

189/last 4 lines: Replace with "Because $\underset{\sim}{K}' = \underset{\sim}{S}'\underset{\sim}{X}'\underset{\sim}{X}$ and because $\underset{\sim}{K}'$ has full row rank it follows that $\underset{\sim}{S}'\underset{\sim}{X}'$ has full row rank; furthermore"

Page/line

190/1-2: Delete top 2 lines.

190/9 up: $\underset{\sim}{X}'(\underset{\sim}{I} - \underset{\sim\sim}{XGX}) = \underset{\sim}{0}$ should be $\underset{\sim}{X}'(\underset{\sim}{I} - \underset{\sim\sim}{XGX}') = \underset{\sim}{0}$; i.e., add a prime

194/bottom*: Delete last paragraph commencing at "A further extension ..."

195/top*: Delete top 2 lines

195/Sec. e*: Replace everything after the first paragraph by the following:

Suppose, however, that checking the estimability of $\underset{\sim}{K}'\underset{\sim}{b}$ in this manner is overlooked and Q is calculated. Then, if in fact $\underset{\sim}{K}'\underset{\sim}{b}$ is not estimable, what hypothesis, if any, is $F(H) = Q/s\hat{\sigma}^2$ testing? In general, the answer appears to be unknown. However, the answer is known for a particular form of generalized inverse, namely, when it is both symmetric and reflexive, i.e., satisfying $\underset{\sim}{G} = \underset{\sim}{G}' = \underset{\sim\sim}{GX}'\underset{\sim\sim}{XG}$. Then for $\underset{\sim}{K}'\underset{\sim}{b}$ not estimable, F(H) tests H: $\underset{\sim}{K}'\underset{\sim\sim}{H}\underset{\sim}{b} = \underset{\sim}{m}$. This is so because on using a symmetric reflexive $\underset{\sim}{G}$ the value of Q for testing H: $\underset{\sim}{K}'\underset{\sim\sim}{H}\underset{\sim}{b} = \underset{\sim}{m}$ is

$$
\begin{aligned}
Q_1 &= (\underset{\sim}{K}'\underset{\sim\sim}{H}\underset{\sim}{b}^{o} - \underset{\sim}{m})'(\underset{\sim}{K}'\underset{\sim\sim\sim}{HGH}'\underset{\sim}{K})^{-1}(\underset{\sim}{K}'\underset{\sim\sim}{H}\underset{\sim}{b}^{o} - \underset{\sim}{m}) \\
&= (\underset{\sim}{K}'\underset{\sim\sim}{GX}'\underset{\sim\sim\sim}{XGX}'\underset{\sim}{y} - \underset{\sim}{m})'(\underset{\sim}{K}'\underset{\sim\sim}{GX}'\underset{\sim\sim\sim}{XGX}'\underset{\sim\sim}{XG}'\underset{\sim}{K})^{-1}(\underset{\sim}{K}'\underset{\sim\sim}{GX}'\underset{\sim\sim\sim}{XGX}'\underset{\sim}{y} - \underset{\sim}{m}) \\
&= (\underset{\sim}{K}'\underset{\sim\sim}{GX}'\underset{\sim}{y} - \underset{\sim}{m})'(\underset{\sim}{K}'\underset{\sim\sim}{GK})^{-1}(\underset{\sim}{K}'\underset{\sim\sim}{GX}'\underset{\sim}{y} - \underset{\sim}{m}) \quad \text{when } \underset{\sim}{G} = \underset{\sim}{G}' = \underset{\sim\sim}{GX}'\underset{\sim\sim}{XG} \\
&= (\underset{\sim}{K}'\underset{\sim}{b}^{o} - \underset{\sim}{m})(\underset{\sim}{K}'\underset{\sim\sim}{GK})^{-1}(\underset{\sim}{K}'\underset{\sim}{b}^{o} - \underset{\sim}{m}) \\
&= Q \quad . \qquad (80)
\end{aligned}
$$

Notice that with $\underset{\sim}{X}'\underset{\sim}{X}$ being symmetric, derivation of a generalized inverse will often be based on the simplified form of the algorithm of Sec. 1.1b, using a non-singular principal minor of $\underset{\sim}{X}'\underset{\sim}{X}$ having the same rank as $\underset{\sim}{X}'\underset{\sim}{X}$. In this case $\underset{\sim}{G}$ will be symmetric

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* These corrections must be made either all together or not at all.

and reflexive, (80) will be satisfied, and F(H) for the non-testable hypothesis H: $\underset{\sim}{K}'\underset{\sim}{b} = \underset{\sim}{m}$ will be a test for the testable hypothesis H: $\underset{\sim}{K}'\underset{\sim\sim}{H}\underset{\sim}{b} = \underset{\sim}{m}$.

Suppose the hypothesis H: $\underset{\sim}{K}'\underset{\sim}{b} = \underset{\sim}{m}$ can be written as

$$H: \begin{bmatrix} \underset{\sim 1\sim}{K}_1'\underset{\sim}{b} \\ \underset{\sim 2\sim}{K}_2'\underset{\sim}{b} \end{bmatrix} = \begin{bmatrix} \underset{\sim 1}{m} \\ \underset{\sim 2}{m} \end{bmatrix} \tag{81}$$

where $\underset{\sim 1\sim}{K}_1'\underset{\sim}{b}$ is estimable and $\underset{\sim 2\sim}{K}_2'\underset{\sim}{b}$ is not. Suppose further that Q for this hypothesis can be calculated. Then by the preceding paragraph, providing $\underset{\sim}{G}$ is symmetric and reflexive, the hypothesis tested using Q is

$$H: \begin{bmatrix} \underset{\sim 1\sim\sim}{K}_1'\underset{\sim}{H}\underset{\sim}{b} \\ \underset{\sim 2\sim\sim}{K}_2'\underset{\sim}{H}\underset{\sim}{b} \end{bmatrix} = \begin{bmatrix} \underset{\sim 1}{m} \\ \underset{\sim 2}{m} \end{bmatrix}, \text{ equivalent to } H: \begin{bmatrix} \underset{\sim 1\sim}{K}_1'\underset{\sim}{b} \\ \underset{\sim 2\sim\sim}{K}_2'\underset{\sim}{H}\underset{\sim}{b} \end{bmatrix} = \begin{bmatrix} \underset{\sim 1}{m} \\ \underset{\sim 2}{m} \end{bmatrix}$$

because $\underset{\sim 1\sim}{K}_1'\underset{\sim}{b}$ is estimable.

Page/line

196/top*: Delete first 3 lines.

199/6 up: Theorem 3 should be Theorem 4

199/3 up: $(\underset{\sim j\sim\sim j}{k}\underset{\sim}{G}\underset{\sim}{k}_j)^{-1}$ should be $(\underset{\sim j\sim\sim j}{k}_j'\underset{\sim}{G}\underset{\sim}{k}_j)^{-1}$; i.e., add a prime.

199/2 up: sufficient should be necessary and sufficient

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* These corrections (see 194/bottom, etc.) must be made either all together or not at all. See also 225/Exercise 7.

Page/line

212/13: a generalized inverse should be the generalized inverse

212/18: " " " should be " " "

212/19: " " " should be " " "

[Note: These changes revert the 2nd printing to the 1st printing, which is correct, as explained by the following footnote.]

212/14: is needed. should be is needed.*

212/Footnote: Add the following footnote:

* Use of "the" generalized inverse is correct here because it refers to the particular generalized inverse used to get a particular solution $\underset{\sim}{b}^{o}$

213/3: Sec. 1.5d should be Sec. 1.5b

213/line above (106): which reduce to should be which, on using $\underset{\sim}{\gamma} = \underset{\sim}{0}$ because the constraints being used are of the form $b_i^o = 0$, reduce to

216/6 lines above (117): $y_.$ should be $y_{..}$

219/last: In G, the last 1 should be 6

224/last: N - r should be p - r

225/Exercise 7*: Replace by the following:

(a) Show that the numerator sum of squares for testing the hypothesis (81) can be expressed as the sum of that for testing H_1: $\underset{\sim}{K}_1'\underset{\sim}{b} = \underset{\sim}{m}_1$ plus

$$(\underset{\sim}{K}_2'\underset{\sim}{b}^{o}_{H_1} - \underset{\sim}{m}_2)'\underset{\sim}{W}^{-1}(\underset{\sim}{K}_2'\underset{\sim}{b}^{o}_{H_1} - \underset{\sim}{m}_2) \quad \text{for} \quad \underset{\sim}{W} = \underset{\sim}{K}_2'[\underset{\sim}{G} - \underset{\sim}{G}\underset{\sim}{K}_1(\underset{\sim}{K}_1'\underset{\sim}{G}\underset{\sim}{K}_1)^{-1}\underset{\sim}{K}_1'\underset{\sim}{G}]\underset{\sim}{K}_2$$

where $\underset{\sim}{b}^{o}_{H_1}$ is a solution for $\underset{\sim}{b}^{o}$ under H_1.

(b) In terms of the example of Sec. 5.5f demonstrate (a) for the hypothesis $H: \alpha_1 = \alpha_2 = 110$. Also, by using one $\underset{\sim}{G}$ that is symmetric and reflexive and another that is not, verify the conclusions of Sec. 5.5e.

235/Eq.(42): μ_i^o should be μ^o

277/5: Delete first word, "of"

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* These corrections (see 195/top, etc.) must be made either all together or not at all.

Page/line

297/Eq.(69): n_{ij} should be $n_{\cdot j}$

305/Eq.(87): $)\gamma_{ij'}$ should be $\gamma_{ij'})$

326/2 up from Eq.(130): $v(\hat{\rho}_i) = \sigma^2 \Sigma_j t_{ij}^2 / n_{ij}$ should be $\hat{v}(\hat{\rho}_i) = \hat{\sigma}^2 \Sigma_j t_{ij}^2 / n_{ij}$

326/Eq.(130): Delete $\hat{\sigma}^2$ from the denominator of equation (130).

353/3: p. 385). should be pp. 385 and 393).

358/Eq.(54): $R(b,\mu,\alpha)$ should be $R(b|\mu,\alpha)$

385/2 below Eq.(10): $\sigma^2_{e\sim i} J_i$ should be $\sigma^2_{\alpha\sim i} J_i$

396/2 above Eq.(14): bn should be abn

396/1 above Eq.(14): an should be abn

406/2: $E(\underset{\sim}{\sigma}^2)$ should be $E(\hat{\underset{\sim}{\sigma}}^2)$

406/1 of para.3: $\underset{\sim}{\sigma}^2$ should be $\hat{\underset{\sim}{\sigma}}^2$

409/Eq.(44): mutually should be pairwise (twice)

417/7 up: $2[E(M^2)]/f$ should be $2[E(M)]^2/f$

435/4 lines below (52): μ and v should be u and v

457/last line: unbiased should be biased

462/8: $E(\underset{\sim}{u}|\underset{\sim}{y})$ should be $\widehat{E(\underset{\sim}{u}|\underset{\sim}{y})}$

483/6 up: after following add based on Tables 10.1 and 10.2

483/5 up: on right margin add [10.2]

483/4 up: on right margin add [10.1]

483/3 up: on right margin add [10.1 and 10.2]

484/5 up on left side of table 11.3: $j \neq j'$ should be j,j'

484/3 up on left side of table 11.3: $t_B = \underset{\sim}{r}'\underset{\sim}{C}^{-1}\underset{\sim}{r}$ should be $t_B = \underset{\sim}{r}'\underset{\sim}{C}^{-1}\underset{\sim}{r} = R(\beta|\mu,\alpha)$

530/1, right-hand column: sulutions should be solutions

530/19, left-hand column: $\underset{\sim}{X}'\underset{\sim}{X}$ should be $\underset{\sim}{X}'\underset{\sim}{X}$